In the first and second embodiments, a combination of a normal amplification circuit and an inversion amplification circuit is required for each output. On the contrary, in this embodiment, a combination of a normal amplification circuit and an inversion amplification circuit is used so as to be common to two outputs, so that the chip size can be reduced. In FIG. **38**, the reference numerals **3801-1** to **3801-240** designate selectors which select gray scale voltages correspondingly to adjacent outputs of gray scale voltages **130-1** to **130-240**. The reference numerals **3802-1** to **3802-240** designate normal amplification circuits and inversion amplification circuits which pass or invert the gray scale voltages selected by the corresponding selectors **3801**. The reference numerals **3803-1** to **3803-240** designate selectors each of which selects one from outputs of adjacent amplification circuits **3802**. These operations will be described below in conjunction with output terminals Y1 and Y2. A gray scale voltage **130-1** corresponding to the output terminal Y1 and a gray scale voltage **130-2** corresponding to the output terminal Y2 are supplied to the normal amplification circuit **3802-1** or the inversion amplification circuit **3802-2** through the selectors **3801-1** and **3801-2**, respectively. Further, the outputs of the normal amplification circuit **3802-1** and the inversion amplification circuit **3802-2** are selected by the selectors **3803-1** and **3803-2**, respectively, and outputted to the output terminals Y1, Y2. A selection signal **3805** for the selectors **3801** and **3803** is a selection signal switched in synchronism with the AC switching signal **106**. Therefore, when the gray scale voltage **130-1** corresponding to the output terminal Y1 is normally supplied to the output terminal Y1, the gray scale voltage **130-2** corresponding to the output terminal Y2 is inverted with respect to the inversion reference voltage **119** and then supplied to the output terminal Y2. When the gray scale voltage **130-1** corresponding to the output terminal Y1 is contrariwise inverted with respect to the inversion reference voltage **119** and then supplied to the output terminal Y1, the gray scale voltage **130-2** corresponding to the output terminal Y2 is normally supplied to the output terminal Y2. In this manner, liquid crystal driving voltages which are inverted to each other in AC switching timing can be supplied to adjacent output terminals.

Further, as shown in FIG. **37**, before liquid crystal supply voltages are outputted, an equalizing period in which adjacent output terminals are connected by the switching circuits **3805-1** to **3805-120** while the outputs are turned into a high impedance state by the switching circuits **3804-1** to **3804-240** is provided so that an operation in which precharging to the level of 10 V is assisted by positive-polarity and negative-polarity electric charge on data lines of the liquid crystal panel is carried out. In this manner, liquid crystal driving power can be reduced by using electric charge remaining in the liquid crystal panel.

What is claimed is:

1. ~~A liquid crystal driver comprising:~~

a plurality of output terminals for outputting display voltages to be applied to a liquid crystal display device;

an input terminal for receiving display data corresponding to said plurality of output terminals; and

output means for converting said input display data into said output display voltages;

wherein said output means selects a display voltage level corresponding to one input display data and simultaneously generates two different display voltages from the selected display voltage level so that either one of said two different display voltages can be selected as an ~~output display voltage for each of~~ said output terminals.

2. A liquid crystal driver according to claim 1, wherein said two different display voltages are a display voltage higher than a reference voltage and a display voltage lower than the reference voltage.

3. A liquid crystal driver according to claim 1, wherein a display voltage to be selected from said two different display voltages is determined on the basis of a signal received from outside the liquid crystal driver.

4. A liquid crystal driver according to claim 1, wherein a display voltage to be selected from said two different display voltages is determined on the basis of input information received together with the display data.

5. A liquid crystal driver according to claim 2, wherein said two different display voltages are inverted relative to each other so as to be symmetric relative to each other with respect to said reference voltage.

6. A liquid crystal driver according to claim 2, wherein one of said two different display voltages is shifted by an amount corresponding to said reference voltage compared with another one of said two different display voltages.

7. A liquid crystal driver according to claim 1, wherein said output means includes level-shift means for shifting said output display voltages with respect to said output terminals.

8. A liquid crystal driver according to claim 1, wherein a signal obtained by periodically switching between said two different display voltages is outputted at each of said output terminals.

9. A liquid crystal driver according to claim 2, wherein during a certain period, a display voltage higher than said reference voltage and a display voltage lower than said reference voltage are respectively supplied to two arbitrary adjacent output terminals.

10. A liquid crystal driver according to claim 1, wherein the liquid crystal driver is constituted by one LSI.

11. A liquid crystal display device comprising:

a liquid crystal panel including pixel portions which are arranged at positions of intersections of a plurality of data lines and a plurality of scanning lines in the form of a matrix;

a scanning driver for successively supplying voltages to said plurality of scanning lines; and

a liquid crystal driver as defined in claim 1 for receiving display data and supplying display voltages to said plurality of data lines in correspondence to said display data.

12. A liquid crystal display device according to claim 11, wherein said scanning driver includes a level-shift circuit for receiving an input signal of a same level as a level of a signal received by said liquid crystal driver, and shifting the level of said input signal to a level allowed to be used in said scanning driver.

13. A liquid crystal driver according to claim 1, wherein said output means includes two different-characteristic output amplification circuits for two adjacent output terminals so that said two different display voltages can be selected

and outputted by switching connections between two gray scale voltage data generated on the basis of input display data corresponding to said two output terminals and input terminals of said two output amplification circuits, and connections between output terminals of said two output amplification circuits and said two output terminals on the basis of an external signal.

14. A liquid crystal driver according to claim 1, wherein said output means includes a combination of a non-inversion output amplification circuit and an inversion output amplification circuit for two adjacent output terminals so that said two different display voltages can be alternately outputted by alternately switching connections between two gray scale voltage data generated on the basis of input display data corresponding to said two output terminals and input terminals of said combination of output amplification circuits, and connections between output terminals of said combination of output amplification circuits and said two output terminals on the basis of an external signal.

15. A liquid crystal driver according to claim 9, wherein said output means includes connection means which connects together two adjacent output terminals outputting a display voltage higher than said reference voltage and a display voltage lower than said reference voltage so that said two adjacent output terminals are connected together during a predetermined period before output display voltages of the two adjacent output terminals are switched.

16. A method of applying display voltages to a liquid crystal display device, the method comprising the steps of:

receiving display data corresponding to output terminals which output display voltages;

generating gray scale display voltage levels on the basis of reference voltages;

selecting one of the gray scale display voltage levels for each output terminal in accordance with said display data, the selected gray scale display voltage level being a first display voltage for the output terminal;

supplying an AC switching signal and an inversion reference voltage, said AC switching signal having a polarity which is periodically inverted;

inverting said selected gray scale voltage level with respect to said inversion reference voltage to generate an inverted selected gray scale display voltage level, the inverted selected gray scale display voltage level being a second display voltage for the output terminal, the second display voltage being different from the first display voltage, the first display voltage and the second display voltage being available simultaneously;

selecting one of the first display voltage and the second display voltage in accordance with the AC switching signal as an output display voltage for the output terminal; and

outputting the output display voltage from the output terminal.

* * * * *

Sub a1

17. ~~A liquid crystal display device comprising:~~

a liquid crystal panel having a plurality of columns and a plurality of rows for displaying an image in accordance with display data; and

a data driver coupled to said liquid crystal panel, said data driver having an input terminal and a plurality of output terminals, each of said output terminals corresponding to each of at least a part of said columns of said liquid crystal panel, said data driver including

a generator for generating a plurality of display voltages, said display voltages including a set of positive and negative polarity gray scale voltages corresponding to each of gray scales,

a selector for selecting one of said plurality of display voltages in accordance with each of said display data and a horizontal position of each of said output terminals corresponding to each of said display data, and

an output circuit for outputting said selected one of said display voltages to said each of said output terminals;

wherein two of said selected one of said display voltages which correspond to adjacent two of said output terminals have different polarity.

18. A liquid crystal display device according to claim 17, wherein the data driver is constituted by at least one integrated circuit.

19. A liquid crystal display device according to claim 17, wherein the gray scales are 64 gray scales.

20. A liquid crystal display device according to claim 17, wherein the generator includes:

a plurality of reference voltage terminals for receiving a plurality of reference voltages; and

a converter coupled to the plurality of reference voltage terminals for outputting the plurality of display voltages;

wherein a number of the display voltages is larger than a number of the reference voltages.

Sub a2

21. A data driver for coupling to a liquid crystal panel, said liquid crystal panel having a plurality of columns and a plurality of rows for displaying an image in accordance with display data, said data driver having an input terminal and a plurality of output terminals, each of said output terminals corresponding to each of at least a part of said columns of said liquid crystal panel, said data driver comprising:

a generator for generating a plurality of display voltages, said display voltages including a set of positive

and negative polarity gray scale voltages corresponding to each of gray scales;

a selector for selecting one of said plurality of display voltages in accordance with each of said display data and a horizontal position of each of said output terminals corresponding to each of said display data; and

an output circuit for outputting said selected one of said display voltages to said each of said output terminals;

wherein two of said selected one of said display voltages which correspond to adjacent two of said output terminals have different polarity.

22. A data driver according to claim 21, wherein the data driver is constituted by at least one integrated circuit.

23. A data driver according to claim 21, wherein the gray scales are 64 gray scales.

24. A data driver according to claim 21, wherein the generator includes:

a plurality of reference voltage terminals for receiving a plurality of reference voltages; and

a converter coupled to the plurality of reference voltage terminals for outputting the plurality of display voltages;

wherein a number of the display voltages is larger than a number of the reference voltages.

Sub a2

25. ~~A method of applying display voltages to a liquid~~ crystal panel, said liquid crystal panel having a plurality of columns and a plurality of rows for displaying an image in accordance with display data, said method comprising the steps of:

providing an input terminal and a plurality of output terminals, said output terminals being coupled to said liquid crystal panel, each of said output terminals corresponding to each of at least a part of said columns of said liquid crystal panel;

generating a plurality of display voltages, said display voltages including a set of positive and negative polarity gray scale voltages corresponding to each of gray scales;

selecting one of said plurality of display voltages in accordance with each of said display data and a horizontal position of each of said output terminals corresponding to each of said display data; and

outputting said selected one of said display voltages to said each of said output terminals, thereby applying said selected one of said display voltages to said liquid crystal panel;

wherein two of said selected one of said display voltages which correspond to adjacent two of said output terminals have ~~different polarity.~~

26. A method according to claim 25, further comprising the step of providing at least one integrated circuit which

includes the input terminal and the output terminal, and which performs the generating, selecting, and outputting steps.

27. A method according to claim 25, wherein the gray scales are 64 gray scales.

28. A method according to claim 25, wherein the generating step includes the steps of:

providing a plurality of reference voltage terminals for receiving a plurality of reference voltages; and

converting the plurality of reference voltages received by the plurality of reference voltage terminals to the plurality of display voltages;

wherein a number of the display voltages is larger than a number of the reference voltages.